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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT 1965

WESTMINSTER

**water pollution
control plant**

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

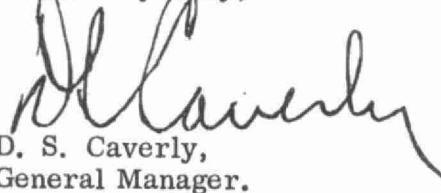
Members of the Westminster Local Advisory Committee,
Township of Westminster.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Westminster Water Pollution Control Plant, OWRC Project No. 59-S-33.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,


D. S. Caverly,
General Manager.



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Westminster Water Pollution Control Plant, OWRC Project No. 59-S-33.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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WESTMINSTER
water pollution control plant

operated for

THE TOWNSHIP OF WESTMINSTER

by the

ONTARIO WATER RESOURCES COMMISSION

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COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5

'65 REVIEW

Total operating cost for 1965 was \$10,614.93 which is a slight decrease from the 1964 operating cost of \$10,784.36. The cost per million gallons treated in 1965 was \$190.49 as opposed to \$205.53 in 1964 and \$376.00 in 1963.

The average daily flow for the year of 152,655 gallons represents an increase of 6% over 1964. This flow also represents 61% of design capacity. Treatment is still being accomplished by one half of the plant facilities.

During 1965 raw sewage strengths of 180 ppm BOD and 393 ppm SS were experienced. Final effluent from the plant had an average BOD of 4 ppm and SS of 11 ppm. These figures represent removal efficiencies of 97.5% and 97.0% respectively.

Industrial wastes created some problems during the year but the biological process was not seriously affected as it has been in previous years.

A chlorine residual of 0.5 ppm was maintained in the final effluent from May 15 to October 22.

The major painting program initiated in 1964 continued into 1965 at a decreased rate and will continue annually. More of the plant grounds were grassed in 1965. The structures and grounds were well maintained.

Two inspections by Head Office technicians were carried out in 1965 and the equipment was found to be well maintained and in good condition. Blower No. 3 was rebuilt during the year; a new sleeve installed on No. 2 sewage pump; and the barminitor overhauled and reconditioned. A total of 56 1/2 hours was spent at the plant by Head Office technicians.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1958 - 1965

INCEPTION

In 1958, the Township of Westminster and the Ontario Water Resources Commission initiated plans for the construction of a modern water pollution control plant.

The firm of S. G. Chipman, Consulting Engineers, London, Ontario, was engaged to prepare plans and specifications for the project.

APPROVAL

In June 1959, the Township signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the plant.

CONSTRUCTION

Frid Construction Company Limited began construction in June 1959 and in May 1960 the Division of Plant Operations took over the operation.

TOTAL COST

\$204,954.00



D. C. SIMPSON
CHIEF OPERATOR

Project Staff

COMMENTS

The Westminster Township plant is operated by one full time operator, D. C. Simpson, with assistance from a casual labourer on a part time basis. Further assistance and guidance are provided as well by the OWRC head office staff of engineers and technicians.

Plant supervision is based on a total of 40 hours per week, 36 occurring during the period from Monday to Friday inclusive and for 2 hours each on both Saturday and Sunday.

Mr. Simpson holds his Certificate of Qualification as a sewage works operator which he obtained in 1964. In April 1965 he attended the OWRC sponsored Chief Operators' Conference.

Description of Project

INFLUENT SEWER

The sewage enters the plant through a 21 inch diameter concrete sewer and passes through a barminitor which shreds the larger solids. A bypass channel equipped with a coarse bar screen is provided when it is necessary to service the barminitor.

The screened and shredded sewage flows to a wet well from which it is pumped by two pumps to the aeration section influent channel.

AERATION

Sewage enters the aeration section - consisting of two rectangular concrete tanks - where it is mixed with activated sludge which is returned from the final clarifiers. The mixture or "mixed liquor" as it is called, is retained in the aeration section for approximately 24 hours during which time it is mixed and aerated by three blowers. It is during this period that the biological activity takes place; dissolved material is absorbed, and suspended and colloidal material is adsorbed by the bacteria.

FINAL SEDIMENTATION

The aerated mixed liquor from the aeration section is retained in two rectangular final tanks for four hours at design flow. This allows the activated sludge to separate from the treated sewage and settle to the bottom of the tank where it is collected by scraping mechanisms to a hopper and returned to either the aeration section or the sludge holding tank. (Excess activated sludge, not required in the treatment process is wasted to the sludge holding tank from which it is hauled from the plant by truck). The treated sewage flows over the weirs of the final tanks to the chlorine contact chamber where it is disinfected by the addition of chlorine. At design flow the treated sewage is retained in the chamber for twenty minutes after which time it is either discharged directly to the creek or to sand filters, depending upon the season.

EFFLUENT SAND FILTERS

When freezing is not a problem; the final effluent or treated sewage is discharged to four rectangular sand filter beds by means of a pump. The effluent passes through these filters and is then discharged to Dingman Creek.

PROJECT COSTS

NET CAPITAL COST (Final)	\$270,727.24
DEDUCT - Payments from Municipality	<u>65,773.40</u>
Long Term Debt to OWRC	<u>\$204,953.84</u>
Net Operating	\$ 10,614.93
Debt Retirement	-
Reserve	1,369.96
Interest Charged	11,499.35
TOTAL	<u>\$ 23,484.24</u>

RESERVE ACCOUNT

Balance at January 1, 1965	9,260.35
Deposited by Municipality	1,369.96
Interest Earned	<u>541.58</u>
Less Expenditures	-
Balance at December 31, 1965	<u>\$ 11,171.89</u>

MONTHLY OPERATING COSTS

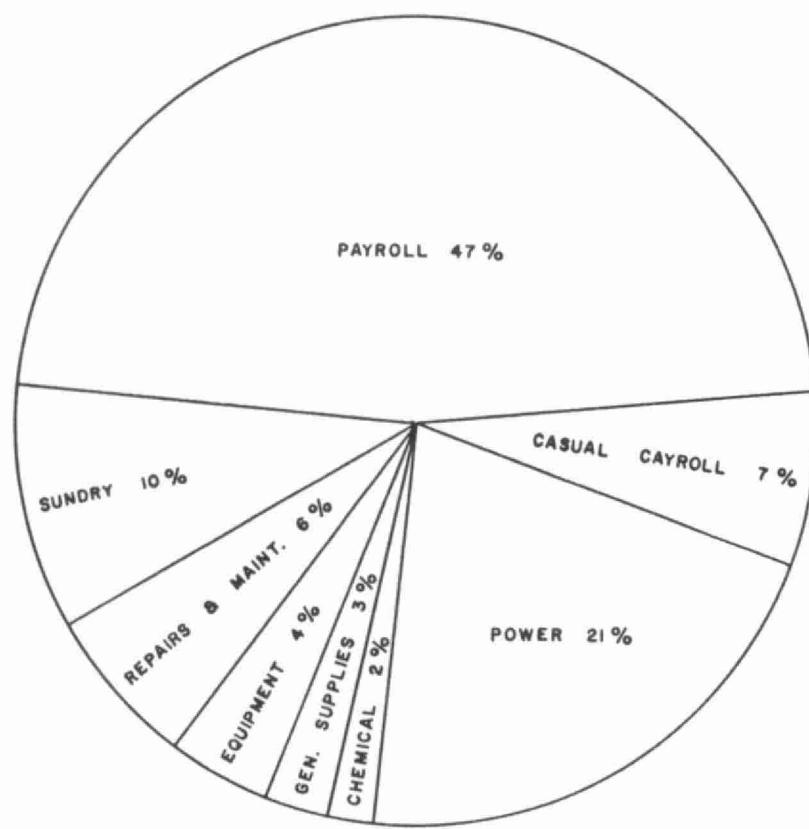
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDAY
JAN	524.53	340.82					20.69			163.02
FEB	611.56	362.93	7.00		227.35					14.28
MARCH	813.79	386.26	7.00		223.96		29.33		136.27	30.97
APRIL	1364.87	427.01	70.00		219.28	523.58	101.13		18.10	5.77
MAY	820.94	535.59			224.47		16.21			44.67
JUNE	353.84	357.06			176.60	(315.00)	20.89		74.95	39.34
JULY	1165.52	370.84			182.88			449.00	162.80	
AUG	664.06	373.30			186.91		17.10	3.55	45.36	37.84
SEPT	1135.64	383.20	12.25		193.91		3.80	8.76	130.17	403.55
OCT	1409.64	678.21	378.00		196.16		45.89		60.00	51.38
NOV	863.17	408.30	273.00		199.43		3.80		(27.13)	5.77
DEC	887.37	387.50			200.62		14.30		60.03	224.92
TOTAL	10614.93	5011.02	747.25		2231.57	208.58	273.14	461.31	660.55	1021.51

* SUNDAY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$327.25
 BRACKETS INDICATE CREDIT

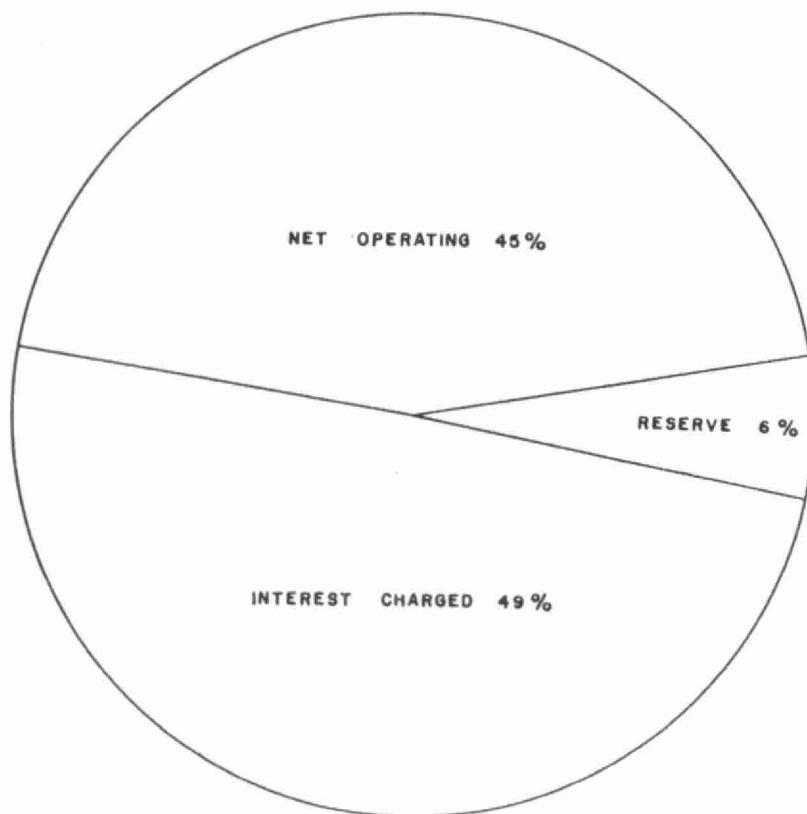
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS
1963	22,613	8,502.58	376.00
1964	52,469	10,748.36	205.53
1965	55,719	10,614.93	190.49

1965 OPERATING COSTS



TOTAL ANNUAL COST



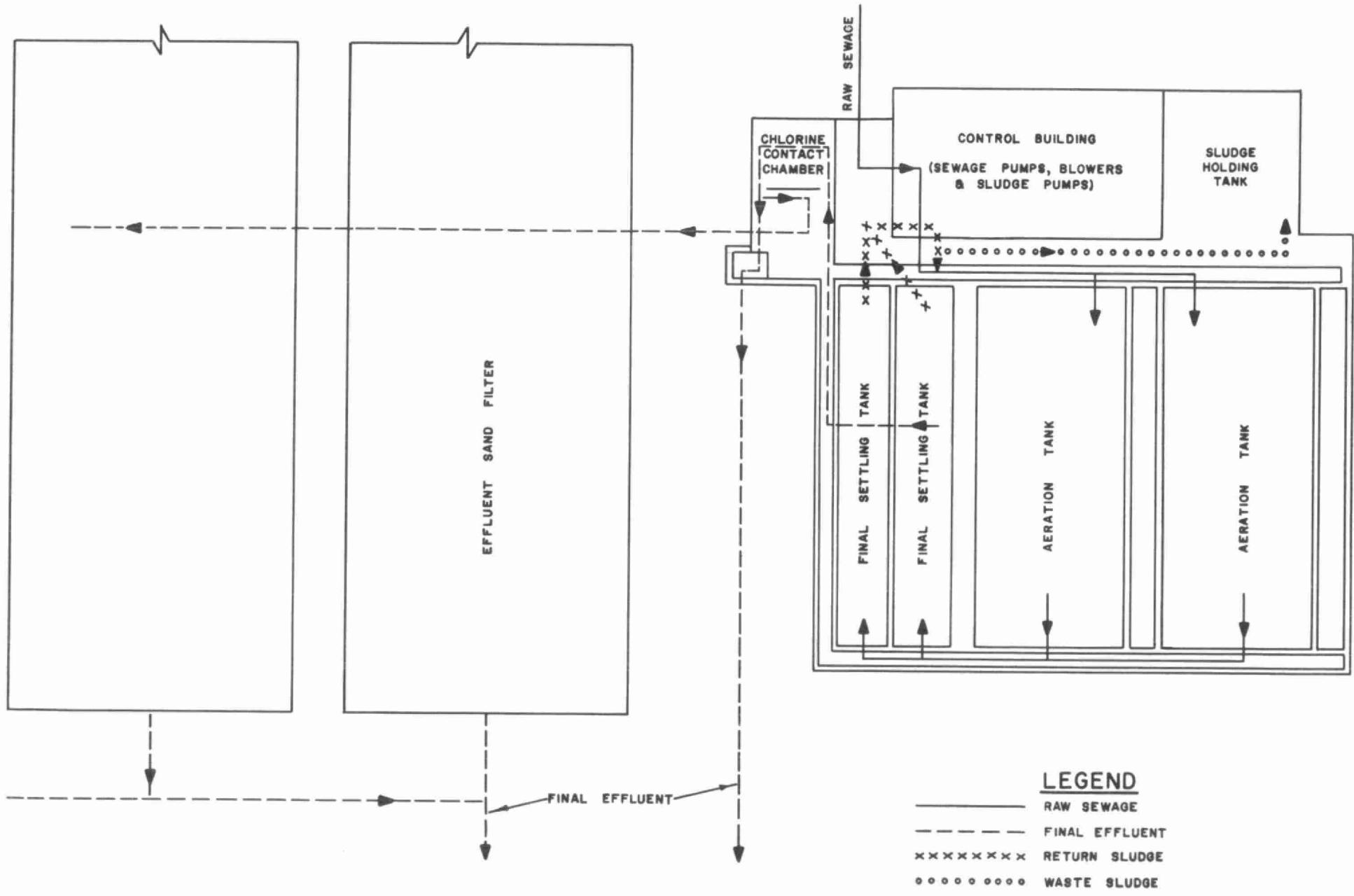


*Technical
Section*



FLOW
DIAGRAM

13



GENERAL

Type of Plant - Extended aeration

Design Population - 5,000 persons

Design Plant Flow - 250,000 GPD

Per Capita Flow - 50 gallons

INFLUENT SEWER

21 in. concrete

SCREENING

Bypass channel equipped with a bar screen with 1 in. spaces.

COMMINUTION

1 - Model B-12 in. Barminutor as manufactured by Chicago Pump Company.

RAW SEWAGE PUMPS

Two 4 in. vertical centrifugal pumps by Chicago Pump Company each having a capacity of 100 GPM at 23 ft. TDH. Both pumps are driven by 2 HP Lincoln motors and #1 pump is also equipped with a standby gasoline engine by Wisconsin; Model TDH.

AERATION TANKS

Two rectangular concrete tanks each 54 ft. by 27 ft. by 14 ft. total volume - 40,368 cu. ft. or 252,000 gallons. Detention time at design flow assuming no return sludge - 24.2 hours.

AIR BLOWERS

Three Sutorbilt blowers model 8HV supplying 337 cfm at 7 psi. Each blower is driven by a 15 HP Leland-Newman Motor.

RETURN SLUDGE PUMP

One 4 in. vertical centrifugal pump by

Chicago Pump Company having a capacity of 200 GPM at 10.5 TDH. This pump is driven by a 2 HP U.S. Vari-drive motor.

FINAL SETTLING TANKS

Two rectangular concrete tanks each 54 ft. by 8 ft. by 9 ft.

Total volume - 7,760 cu. ft. - 48,500 gallons.

Detention period at design flow - 4.65 hours.

Total surface settling rate - 580 gallons per sq. ft. per day.

Each tank is equipped with sludge collector mechanisms by Link-Belt which are driven by 1/2 HP Leland Electric Motors.

CHLORINE CONTACT CHAMBER

One rectangular concrete tank 10 ft. by 7 ft. by 9 ft.

Total Volume - 630 cu. ft. - 3930 gallons

Contact period at design flow - 22.7 minutes.

CHLORINATOR

One Wallace and Tiernan Model A-741 capable of metering 100 lbs. of chlorine per 24 hours.

EFFLUENT WELL PUMP

One 900 GPM at 9.6 ft. TDH Chicago Pump Company driven by a 5 HP Lincoln motor.

EFFLUENT SAND FILTERS

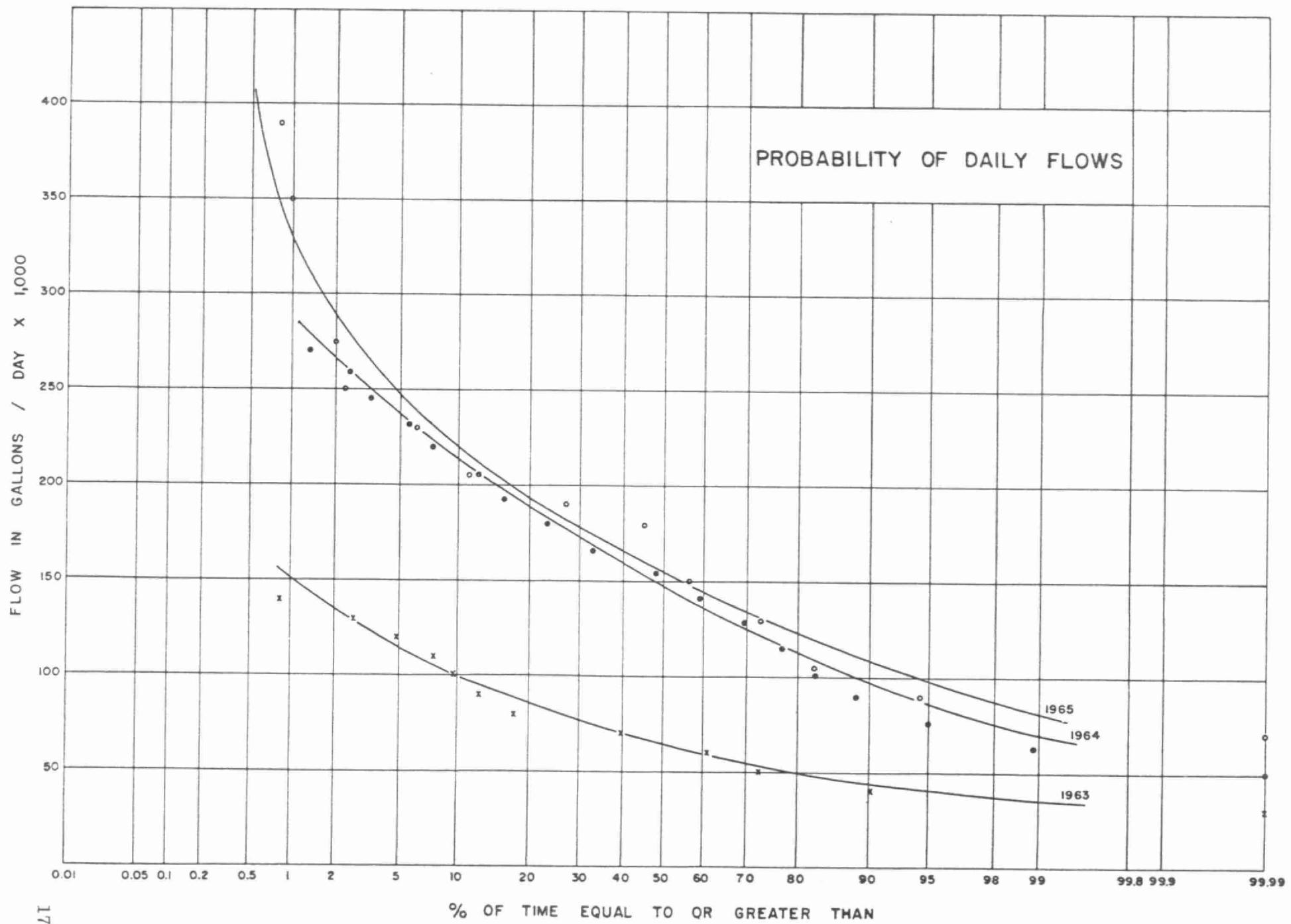
Four rectangular units having a total area of 26,900 sq. ft. or 0.62 acres. Capacity of the filters is 450,000 gallons per acre per day. Minimum depth of sand is 30 inches.

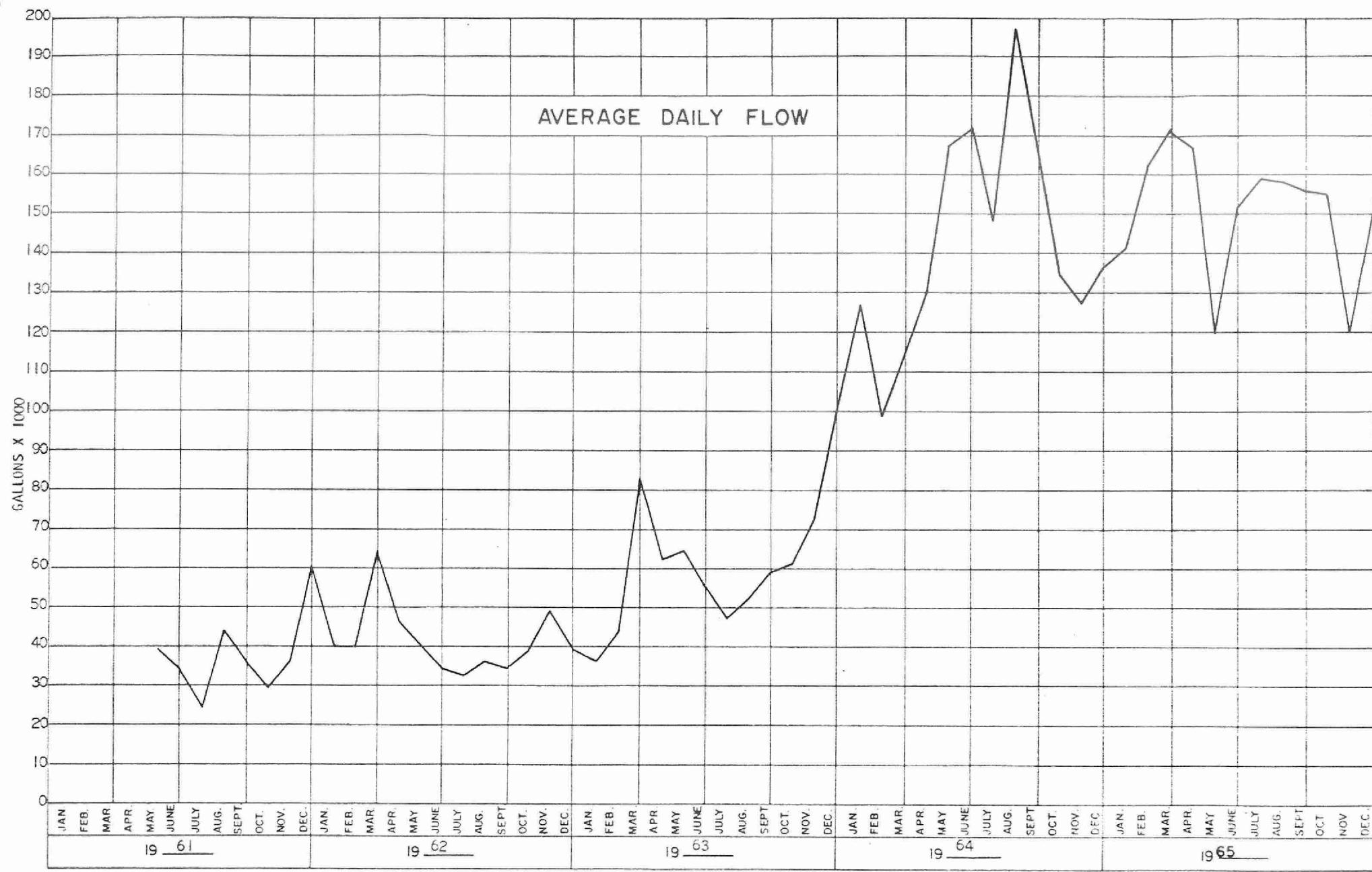
SLUDGE HOLDING TANK

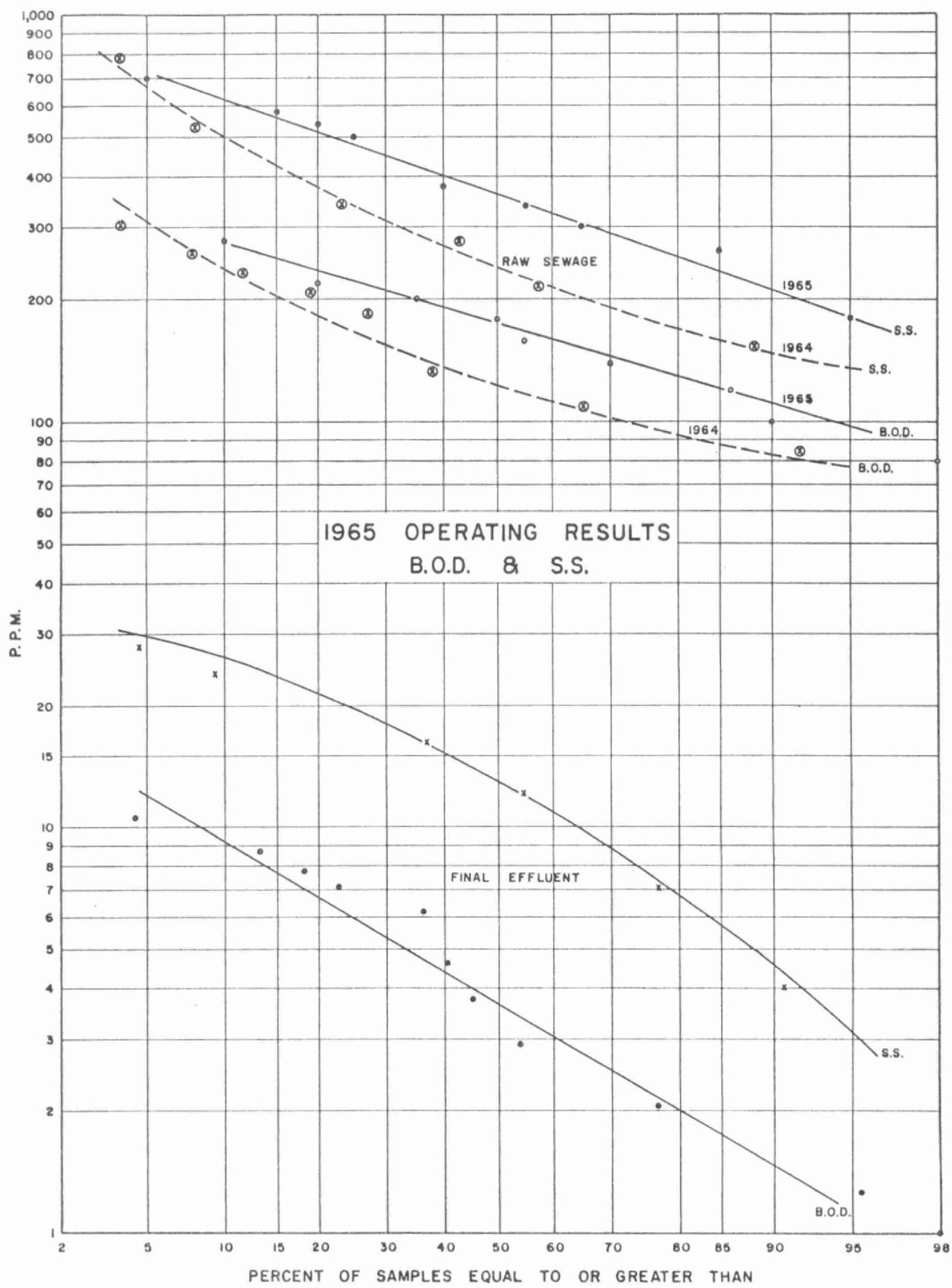
Total volume of 4,460 cu. ft.

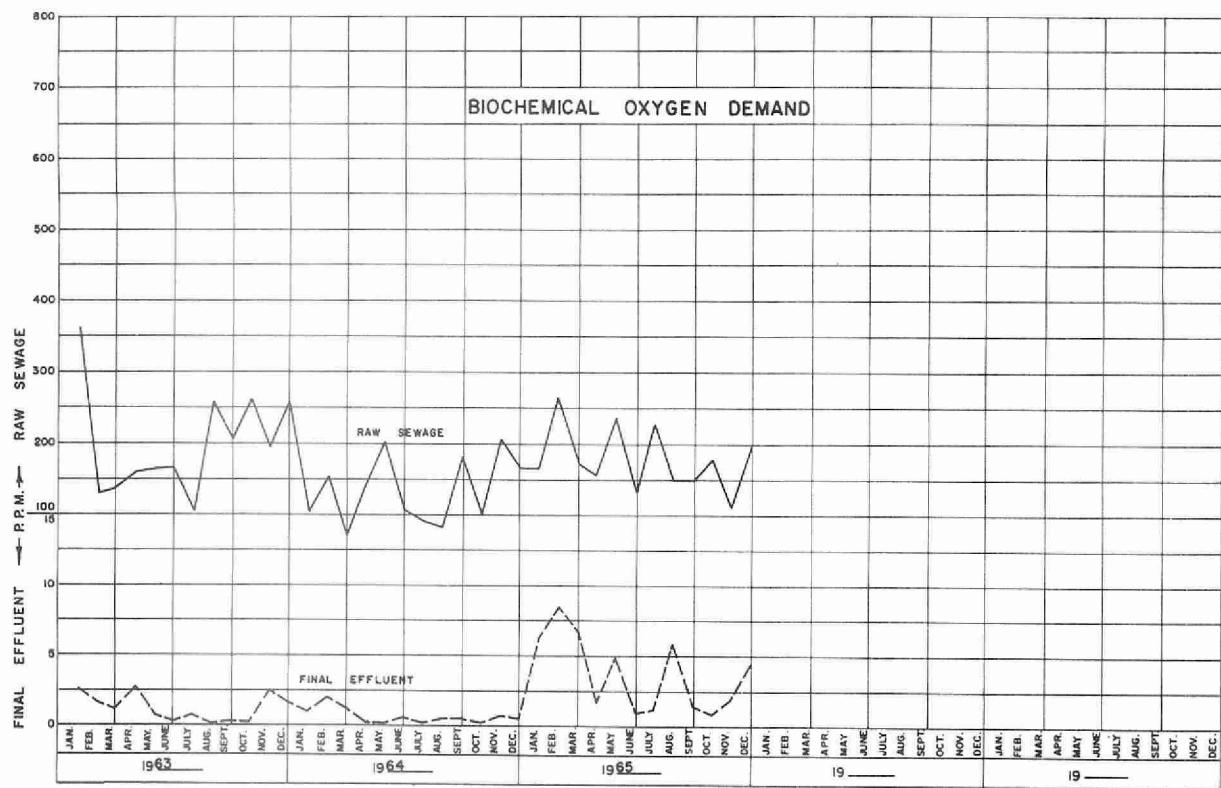
Process Data

A total of 55.719 million gallons of sewage was treated at the plant in 1965 as compared to 52.469 million gallons in 1964. This is an increase of 6%. The average daily flow for the year was 152,655 gallons and represents 61% of the design flow. The maximum average daily flow for a month occurred in March when the flow was 170,967 gallons per day which represents 68% of the design capacity.

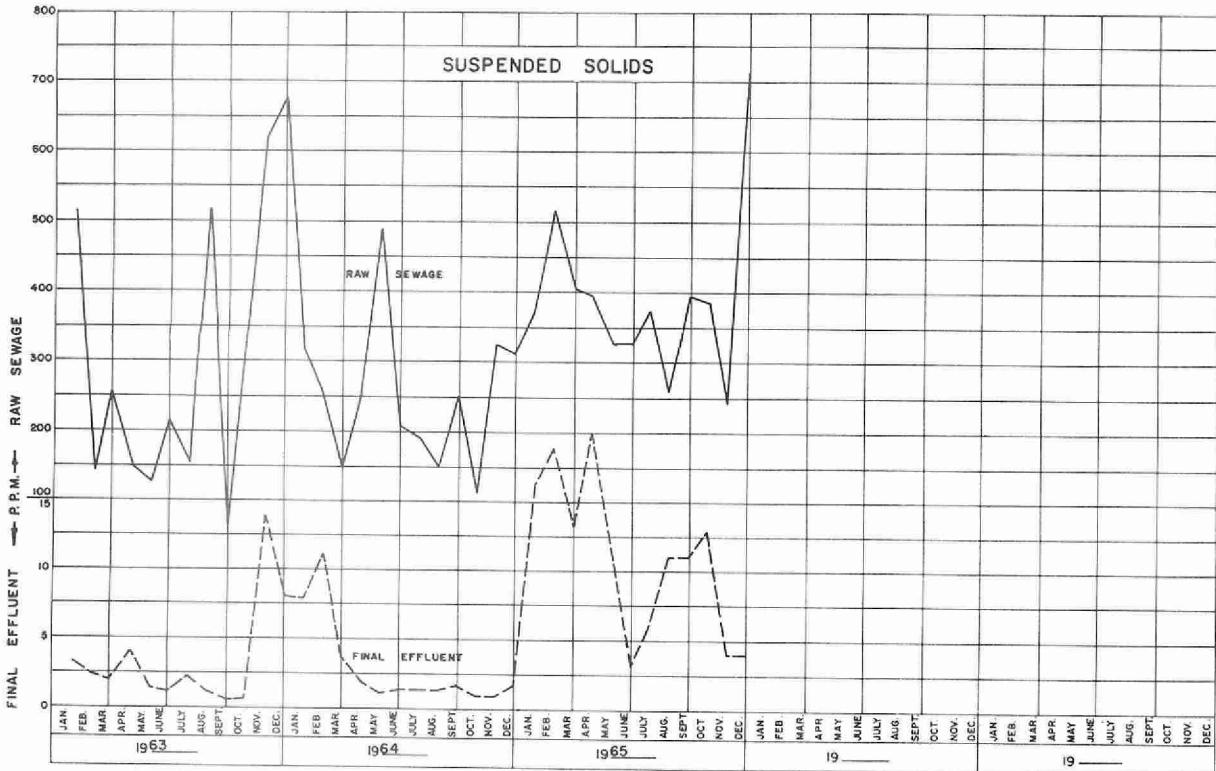








MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	165	6.2	96.0	3.5	372	16	95.5	7.8	-
FEB.	270	8.3	97.0	5.9	516	19	96.5	11.3	-
MAR.	179	7	96.0	4.6	404	13	96.5	10.4	-
APR.	158	1.8	99.0	3.7	398	20	95.0	8.9	-
MAY	240	5	98.0	4.4	327	12	96.5	5.9	-
JUNE	130	1	99.0	2.9	327	3	99.0	7.4	-
JULY	230	1.2	99.5	5.6	374	6	98.5	9.1	-
AUG.	151	6	96.0	3.6	259	11	95.5	6.1	-
SEPT.	150	1.6	99.0	3.5	394	11	97.0	8.9	-
OCT.	182	1	99.5	4.4	384	13	96.5	8.9	-
NOV.	110	2	98.0	2.5	246	4	98.5	5.6	-
DEC.	200	4.4	98.0	4.4	718	4	99.5	16.2	-
TOTAL	-	-	-	49.0	-	-	-	106.4	-
AVG.	180	4	97.5	4.1	393	11	97.0	8.9	-

COMMENTS

The average strength of the raw sewage for the year was 180 ppm BOD and 393 ppm SS. The final effluent had an average BOD of 4 ppm and an average SS of 11 ppm which resulted in an average reduction of 97.5% and 97.0% respectively. The final effluent BOD met the Ontario Water Resources Commission objective of 15 ppm 97% of the time and the SS objective of 15 ppm 60% of the time. The above results are based on samples taken every two weeks.

AERATION SECTION

MONTH	* B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	165	5414	3	2400
FEBRUARY	270	5162	5	1200
MARCH	179	5574	5	1800
APRIL	158	5643	4	2200
MAY	240	6086	3	2000
JUNE	130	6099	3	3100
JULY	230	5817	6	1600
AUGUST	151	5943	3	2600
SEPTEMBER	150	6343	3	2500
OCTOBER	182	6228	6	2000
NOVEMBER	110	5600	2	3500
DECEMBER	200	6259	4	2000
TOTAL	-	-	-	-
AVERAGE	180	5847	4	2100

* EXTENDED AERATION PLANT, THEREFORE NO PRIMARY TANKS

COMMENTS

One tank of the aeration section was used for aeration and the other tank was used as an aerobic digester in 1965.

The average loading of the aeration tank was 4 pounds BOD per 100 pounds mixed liquor SS with an average of 5847 ppm SS in the mixed liquor. An average of 2100 cu. ft. of air was supplied per pound of BOD and includes air supplied to the aerobic digester. Approximately 10% of the air supply goes to the aerobic digester.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	4.367	-	-
FEBRUARY	4.532	-	-
MARCH	5.300	-	-
APRIL	4.709	-	-
MAY	3.735	* 106	5.89
JUNE	4.555	261	5.73
JULY	4.937	257	5.20
AUGUST	4.906	270	5.50
SEPTEMBER	4.673	273	5.84
OCTOBER	4.811	** 185	5.42
NOVEMBER	4.645	-	-
DECEMBER	4.549	-	-
TOTAL	55.719	1352	-
AVERAGE	4.643	225	5.57

* 15 days chlorination

** 22 days chlorination

COMMENTS

The final effluent was disinfected with chlorine from May 15 to October 22. A total of 1352 pounds of chlorine was used at an average dosage of 5.57 ppm. A residual of at least 0.5 ppm was maintained during this period.

LABORATORY LIBRARY



96936000119868

CONCLUSIONS

The plant operated at 61% of design capacity during the year and has more than sufficient capacity for the present flows. The plant efficiently treated the sewage when it was not hampered by adverse industrial wastes. The use of the sand beds improved the quality of the effluent. The total cost of operation was less than in 1964 and the cost per million gallons treated was less than in 1964. The plant was well maintained and operated during the year.

